СОЭКС



экотестер

CONTENTS

Ecotester Soeks

Purpose

Ecotester SOEKS is designed for express analysis of fresh fruit, vegetables and meat for nitrates and for assessing the product radioactivity level and detecting objects, food or construction materials contaminated with radioactive elements.

Nitrate content analysis is based on conductivity of alternating high-frequency current the measured food items.

Ecotester can easily assess the level of radioactivity according to the power level of ion radiation (gamma radiation and beta particles stream) with taking into account x-ray radiation.

Base kit

Ecotester SOEKS has the following items included in the base kit:

Ecotester Soeks	1 pcs
Passport	1 pcs
2 batteries (AAA size)	2 pcs
Rigid paperboard box	1 pcs

Battery charger, power cord, rechargeable batteries and other accessories and supplies are purchased separately.

A Geiger-Muller counter is used as ion radiation senser in our device.

The manufacturer reserves the right to add new features to the device. Please follow new code modifications on the official website: **www.soeks.ru**. The device's code can be modified only in the manufacturer's service centers.

Specification

Range of indicated nitrate content, mg/kg	from 20 to 5 000
Range of indicated background radiation level, mcSv/h	from 0,03 to 1 000
Range of indicated background radiation level, mcR/h	from 3 to 100 000
Registered gamma radiation energy	from 0,1
Levels, mcSv/h	from 0,3 to 100
Levels, mcR/h	from 30 to 10000
Time of measurement, seconds	up to 20
Display format of indication	Constantly, number and graphical
Power elements	AAA size batteries rechargeable or non-rechargeable
Power voltage range, V	1,9 - 3,5
Time of continuous work of the device, hours at least**	10
Overall dimensions height x width x thickness, max, mm	144x47x17
Weight (without power elements), max, grams	66
Battery charging current, max, mA	300
Current consumption from charger or USB not more than	500
Output charger voltage	from 4,5 to 5,5
Display	Color TFT, 128x160
Operating temperature range, °C	from -20 to +60

Comment:

* Increasing the number of measurements shall improve the reliability of readings.

** The time of continuous work of the device is up to 10 hours, with default settings and two batteries of capacity 1,350mAh.

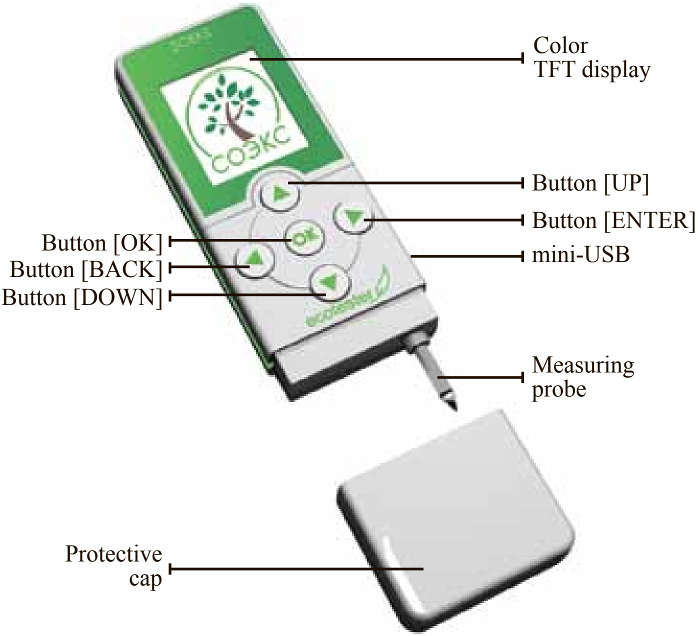
*** Default settings: measuring units– mcSv/h, alarm level - 120, color theme - green, sound – on.

Precautions

Before using the product, please read carefully the safety measures below and strictly observe them when using the product. Violation of these rules may cause malfunction or cause total failure of the product. The manufacturer's guarantee shall be void if the safety measures stated below are violated.

• Protect the product from shock and other mechanical impacts that can damage it.
• Do not use the product in conditions of high humidity, under or in contact with water: the product is not waterproof.
• Do not leave the product in places with intensive sun light or high temperatures for a long time, this can cause electrolyte leakage from power elements, failure of the product, and injuries.
• Do not leave the product for a long time near devices that generate strong magnetic fields, such as magnets or electric motors, and where strong electrical magnetic signals are generated, such as transmitter towers.
• Do not perform measurements close to cell phones and microwaves, this may affect the instrument's readings.
• Do not disassemble and do not try to repair the device on your own.
• Do not connect the device to a PC or socket while it has regular batteries installed.
• Strictly observe polarity when you install power elements, otherwise the device may overheat and fail.

Appearance of the Device



Controls

Button [OK] – turn the device on/off,
confirmation in nitrat-tester mode.
Button [ENTER] – confirm selection.
Button [BACK] – back to previous menu.
Button [UP] – moving up in the menu.
Button [DOWN] – moving up in the menu.

Power

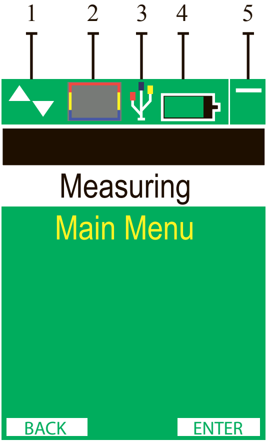
At the back side of the device there is the cover of the battery section. AAA type batteries or accumulators can be used to power the device. The bottom of the battery section shows the manufacturer's trademark - SOEKS - and board model.

The front side of the device has a mini-USB port that can be used to recharge batteries from a computer via a USB-mini-USB cable or from the power mains. If connected to a PC or electric mains, the device can work without power elements.

How to install power elements

- Strictly observe polarity when you install power elements, otherwise the device may fail.
- The type of power elements installed must match the parameters preset in the 'Power' menu item (page 38).
- When the device is turned off, you can leave the power elements installed – the batteries and accumulators are not spent if the device is in standby mode.
- If you expect not to use the device for a long time, it is recommended to remove the power elements after the device is turned off.

Screen Indicators



1. List indicators – appear if the list exceeds the screen.

 - the list exceeds the bottom limit of the screen

 - the list exceeds the top limit of the screen

 - the list exceeds both the top and bottom limits of the screen

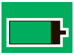
2. Diagram
Shows radioactivity during the previous minute. The diagram keeps moving from right to left, and the bar height shows the level of background radiation: the higher the background, the taller the bar. The bar may be blue, yellow and red.

3. USB indicator

 - USB cable connected  - batteries are charging

 - charging completed

4. Battery charge status indicator:

 - normal power level

 - running down

 - low power level

 - replace or recharge the batteries

5. Active status indicator
The continuously moving element in the upper right corner of the screen indicates the device's active status.
When buttons are pressed, icons in this area show which button has been pressed.

 - the [BACK] button was pressed

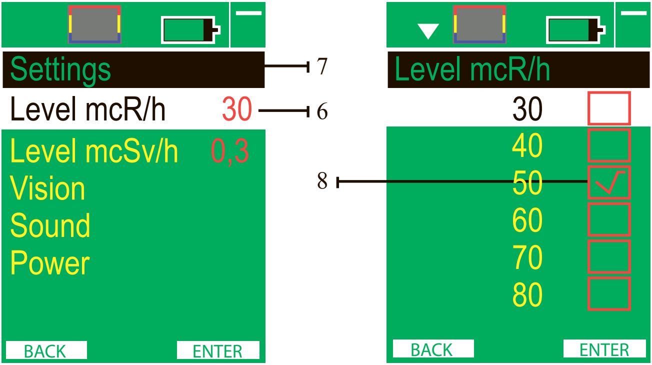
 - the [ENTER] button was pressed

 - the [OK] button was pressed

 - the [UP] button was pressed

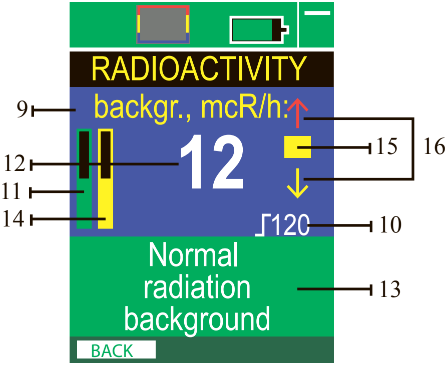
 - the [DOWN] button was pressed

Menu indication and navigation



6. The current (selected) line is highlighted with color.
7. Inside a selected menu item, the upper line on the list indicates the parent menu item.
8. As the device is being set up, the current parameter value is flagged with a tick mark.

Indicators in the «Measuring» mode
A screen with the following elements appears in the measure mode:



9. Units: mcR/h or mcSv/h

10. Level in preset units

11. Indicator of measured results: filled up within 10 sec. If the background radiation is high the result may be available much sooner.

12. Radiation level. Shown as large digits in the screen center. The first measurement also shows the word «MEASURING»

13. The message about radiation bagkground:
- if the measured background radiation is less than 40 mcR/h, a «NORMAL RADIATION BACKGROUND» indication appears on a green background.
- if measured background radiation is 40-120 mcR/h, caption «HIGH RADIATION BACKGROUND» appears on a yellow background.
- if the measured background radiation is greater than 120 mcR/h, caption «DANGEROUS RADIATION BACKGROUND» appears on a red background.

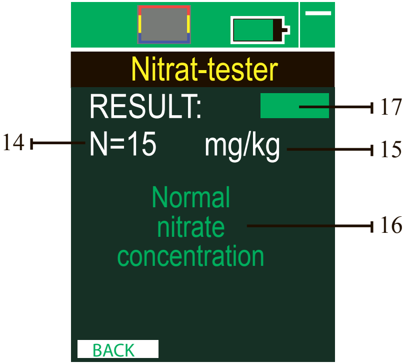
14. The indicator of measurement accuracy – with increasing of accuracy fills in with yellow colour. With each measurement (it takes 10 sec.) the column of the indicator of measurement accuracy grows till complete fulfillment. The complete fulfillment takes about 2 minutes (12 measurements). If during the measurement some sharp changes of the radiation are defined (more than three times increasing or ten times decreasing), than the indicator of measurement accuracy zeroes. Thanks to this fact, the defining of sharp changes of radiation background with reflection of exact data takes no more than 10-20 seconds.

15. The indicator of defining radiation fractions: If the fractions follow often, than the indicator blinks with yellow and red, if the fractions are rare – the indicator is yellow.

16. The indicators of radiation background changes:
- One red up arrow appears when increasing of radiation background is more than 30% of average.
- One red down arrow appears when decreasing of radiation background is more than 30% of average.
- Two red up arrows appear when the increasing of the radiation background is considerable.
- Two green or yellow down arrows appear when decreasing of radiation background is considerable.

Indicators in the «Nitrat-tester» mode

A screen with the following elements appears in the measure mode:



14. Measuring result.
15. Unit of measure: mg/kg.
16. Result message showing nitrate concentration based on maximum daily rates of nitrate consumption with food.

- if the measured result of nitrate concentration does not exceed the medium norm of nitrate consumtion - you will see the following message marked green «Normal nitrate concentration».
- if the measured result of nitrate concentration exceeds the medium norm of nitrate consumption not more than 20% - you will see the following message marked yellow «Insignificant excess of standart!»
- if the measured result of nitrate concentration exceeds the medium norm of nitrate consumption not more than 50% - you will see the following message marked red «Significant excess of standart!»
- if the measured result of nitrate concentration exceeds the medium norm of nitrate consumption more than 50% - you will see the following message marked red «Dangerous concentration of nitrates!»

17. Coloured indicator.

The device's menu consists of 3 items:
● Radioactivity – enter the radioactivity detecting mode
● Nitrat-tester – enter the nitrate measuring mode
● Main menu – device settings

Main menu

● **Units**

In this item you select units to measure the radiation background: mcR/h or mcSv/h.

There are many different units to measure radiating doses.

Roentgen – in use since 1928 to measure generated radiation or exposure dose.
Sievert – in use since 1979, named after Rolf Sievert – a Swedish scientist.
100 Roentgen = 1 Sievert, provided that only the biological effect of radiation is considered.

By dividing 1 Sievert by 1000 we receive a millisievert. 1 mSv is one thousandth of one Sievert. Millisievert is often used as a measure unit in diagnostic procedures (X-raying, X-ray computed tomography etc.)

Microsievert – 1 mcSv – is one thousandth part of a millisievert or one millionth part of one Sievert. Film photofluorography equals 500-800 mcSv, digital is 60 mcSv. Computed skull tomography on a step-by-step tomograph ensures 1,000-15,000 mcSv, a modern spiral tomograph gives 400-500 mcSv, and a maxillofacial tomograph with two-dimensional sensor ensures 45-60 mcSv.

If radiation background exceeds 0.4 mcSv/h., you need to look for the reasons of this exceeding.
If radiation background exceeds 1.2 mcSv/h., it is not recommended to stay in this place, it may be dangerous.

Natural radiation background in Russia is 0.05-0.20 mcSv/h. (5-20 mcR/h.).

● **Language**

In this item you can select the interface language. This device has only two options: English and Russian.

Attention! After the [BACK] button is pressed the screen will display the root menu in the selected language. If you made an error and selected the unfamiliar language, press the following sequence of buttons to return to the language selection menu: **DOWN-DOWN-ENTER-DOWN-ENTER.** Then select the language you need.

Settings

In this section you can preset the parameters for the device and the interface.

Items of the Settings menu:

● **Level in mcR/h.**
● **Level in mcSv/h.**

These items are related: when one is changed, the other also changes.

You can select the threshold value from 16 preset values on the list.

mcR/h.	mcSv/h.
30	0,3
40	0,4
50	0,5
60	0,6
70	0,7
80	0,8
90	0,9
100	1
120	1,2
150	1,5
200	2
500	5
1000	10
2000	20
5000	50
10000	100

If the measured background radiation exceeds the preset level, alarm sound appears.

Alarm sound switching off:

settings > sound > alarm sound

● **Vision**

In this item you can adjust screen settings: brightness, display time, and color pattern.

● Brightness

Select low, medium or high brightness level of the screen.
To save power and help the batteries last longer it is recommended to use the low or medium brightness level of the screen.

● MinutesOn.

Set the time of display backlight in standby mode. You can select from 1 to 15 minutes in the options list.

● AlwaysOn

yes – cancels the MinutesOn parameter. Backlight is always on while the device is in use.
no –the screen’s backlight works as preset in the MinutesOn function.

● Theme

Select from 4 possible combinations of background and font color: green, gray, blue and white.

● **Sound**

In this item you can adjust the sound parameters.

● Sound on (yes/no)

● Sound tone

Select one of the 4 available sound tones.

● Keypad tone (yes/no)

To save power and make the batteries last, it is recommended to turn the sound off.

● Alarm sound (yes/no)

Sound indication of level of radiation background exceeding.

● Volume (low/medium/high)

Default is the average volume.

●**Power**

In this item you can adjust parameters of the power elements used in the device.

● Accumulators

Select 'yes' if the device has rechargeable accumulators installed and 'no' if regular batteries are used. Incorrectly selected parameter of the installed power supply type may cause incorrect indication of power charge.

If 'yes' parameter is selected the accumulators will recharge while connected to a PC or charger via a mini-USB slot.

Attention! Never connect the device to a charger or a PC if it has batteries installed. This can overheat the power elements, cause their failure and electrolyte leakage, damage the case and break the device.

● Sleep

Set the time in minutes after which the device shall automatically shut down.

● AlwaysOn

yes – cancels the value of the Sleep parameter. The device will work until turned off with the [OK] button.

no – the device automatically shuts down according to the set Sleep parameter.

Power control of the device

1. To turn the device on, press and hold the [OK] button until the display turns on (the screen backlight is on) then release the [OK] button.
- When the device is on, an animated screen with the company's logo appears. To skip this screen press the [ENTER] button.
- After the splash screen the display will indicate the model (code modification version) of the device for 3 seconds.

2. To turn the device off press and hold the [OK] button until the display shows an animated screen with falling autumn leaves. Then release the [MENU] button.

Pressing and holding the [OK] button will turn the device off in any mode.

3. While connected to a USB, the device will be on, even without power elements installed. If the device automatically turned on while connected to USB; disconnecting the device from the USB slot will shut down the device.

When the device is off, you can leave the power elements installed – batteries and accumulators are not spent if the device is in standby mode. If you expect not to use the device for a long time, it is recommended to remove power elements after the device is turned off.

Beginning to Use the Device

1. Install the power source (page 29,38)
2. Turn the device on (page 39)
3. Before you begin measurements, we recommend that you tune up the device (page 36)
4. Select the 'Measuring' menu item.

After turning on, the unit begins to examine the radioactive situation. In 10 seconds approximately you will see the first readings on the display, and the next measuring cycle will begin. Be sure that at least 4 or 5 cycles run to achieve accurate results.

If the readings are higher than the natural radiation background typical for the locale, this means that the examined object is contaminated by radiation.

Results obtained using the device can not be used for official conclusions regarding the radiological situation.

Measuring radiation background of objects

To measure radiation background of foodstuffs, building materials and other things do this sequence:

1. Measure the level of radiation background several meters away from the target.
2. Move the device directly to the target and measure radiation background as close as possible to the target.
3. Compare the resulting data with the radiation background level measured in step 1.

The difference of readings in step 1 and step 2 will represent the radiation background of the target.

To evaluate radioactive contamination of liquids, the unit must be placed above open surface of the liquid. To protect the unit from contact with the liquid, it is recommended that the unit should be wrapped in a polyethylene bag, but ensuring that the wrapping is one layer of plastic only.

- In the measuring mode, press any button to return to the root menu.
- If the screen goes blank, press any button to reactivate it.

Measuring nitrate concentration of fruit and vegetables.

1. The measured foodstuff should be clean without any mud on the surface. You should clean the measured foodstuff without any cleaning agent, with clear water only, it should not be rotten or damaged. Foodstuff should be fresh. You can use cut pieces of the foodstuff that were made not later than 15 min.

2. Choose the foodstuff from the menu list. Norms of maximum nitrate concentration limit are mentioned below.

Product	Norms	Designation in menu
Apple	60	Apple
Apricot	60	Apricot
Banana	200	Banana
Beet	1400	Beet
Cabbage early	900	Cabbage E
Cabbage late	500	Cabbage L
Carrot early	400	Carrot E
Carrot late	250	Carrot L
Cucumber soil	150	Cucumber S
Cucumber gr.	400	Cucumber G
Eggplant	300	Eggplant
Grapes	60	Grapes
Greengrocery	2000	Greengrocery
Pear	60	Pear
Lettuce	2000	Lettuce
Marrow	400	Marrow
Melon	90	Melon
Nectarine	60	Nectarine
Onion Bulb	80	Onion Bulb
Onin Green	600	Onion Green
Peach	60	Peach
Peper Sweet	200	Peper Sweet
Persimmon	60	Persimmon
Potatoes	250	Potatoes
Radish Black	1000	Radish Black
Radish Garden	1500	Radish Garden
Strawberry	100	Strawberry
Tomato soil	150	Tomato S
Tomato gr.	300	Tomato G
Watermelon	60	Watermelon
Baby Norm	50	Baby Norm
Fresh Meat	200	Fresh Meat

3. After foodstuff selection you will see the following text in the menu: «Make sure that probe is not stuck in testing product and press OK»

4. Clean the probe with alcohol and then with paper napkin. The probe should be dry.

5. Press [OK] button. You will see that preparation process has begun(self calibration). The following text message will appear “Wait please. Preparation to analysis in process”. Do not touch the probe until you`ll see new text instructions.

6. Please wait until you`ll see the following text message “Stick probe into product. Press OK” Besides harmless recommended norm of nitrates for selected foodstuff will be shown.

7. Stick the probe info the tested foodstuff hold the device perpendicularly to it in direction to the center of it. Do not move or the press probe. The depth of sticking the probe should be at least 10 mm. The pointed cone of the probe should not go out of the foodstuff, be in the seed zone or hollow spaces. It should be sticked to the most juicy part of the foodstaff.

Notice that you should not use holes that were made by probe or other device iteratively

8. Press [OK] button. The measurement process will begin.

9. Wait for the results will be displayed. During the measurement you will see the following message «Wait please! Measurement in process». Please do not move the probe during the measurement.

10. Chek the results.

11. Pull the probe out of the foodstuff.

12. Push the [BACK] button to go back to the menu.

Device measures nitrate concentration per 1 kilogram of the product.

Harmless day dose of nitrates is 200-300 mg per one grownup person. Therefore if you eat 2 kiligrams of a watermelon with 350 mg/kg nitrate concentration you risk to pick up a nitrate poisoning. Remember that normal concentration for a watermelon is 60 mg/kg. Some food stuffs as beet, radish, dill, cabbage lettuce have high norm of nitrates. Normal concentration for beet is 1400 mg/kg. If you eat such foodstuffs in large amounts please keep in mind maximum harmless doses that were pointed earlier.

Example: You measured beet and nitrat-tester measured 1000 mg/kg nitrates per kilo. This concentration is normal for this foodstuff and you can eat not more than 200 grams of such beet.

Notice that there are special norms for children, because child's organism undergoes by nitrate poisoning much more than grownups. Harmful doses for little children are 10-50 mg/kg.

В заключение приведём значения предельно допустимых доз и некоторые официальные данные о последствиях облучения для человека.
20 мЗв - предельно допустимая доза (ПДД) - наибольшее значение индивидуальной эквивалентной дозы для персонала объектов атомной промышленности, непосредственно работающего с ИИИ (категория А облучаемых лиц) за календарный год. При такой годовой дозе равномерное облучение в течение 50 лет не может вызвать в состоянии здоровья неблагоприятных изменений, обнаруживаемых современными методами. Эта доза эквивалентна тому, что человек постоянно в течение 50 лет находится (живёт) в условиях фона в 570ч650 мкР/час.
5 мЗв - предел дозы (ПД) - допустимая индивидуальная эквивалентная доза облучения населения, проживающего в санитарно-защитных зонах, зонах наблюдения объектов атомной промышленности (категория Б облучаемых лиц) за календарный год. При такой годовой дозе равномерное облучение в течение 70 лет не вызывает изменений в состоянии здоровья, обнаруживаемых современными методами диагностики. Исходя из этой дозы, допустимый безопасный фон 55ч65 мкР/час (0,6 мкЗв/час).
0,5 мЗв - по существовавшим ранее нормам годовая предельно допустимая индивидуальная эквивалентная доза для внешнего и внутреннего облучения всего населения. В настоящее время эта доза не регламентируется. Ей соответствует фон в 5-7 мкР/час (0,06 мкЗв/час).
0,1 Зв - в течение года - не наблюдается каких-либо заметных изменений в тканях и органах.
0,75 Зв - незначительные изменения в крови.
1Зв - нижний предел начала лучевой болезни.
3-5 Зв - тяжёлая степень лучевой болезни, погибают 50% облучённых.

To conclude description, here are values of maximum permissible doses and certain official information about consequences of radiation exposure for humans.
20 mSv – maximum permissible dose (MPD) – annual highest value of individual equivalent dose for nuclear sector personnel who work directly with sources of ionizing radiation (category A). Such annual dose of homogeneous irradiation for 50 years cannot trigger adverse changes in health detectable by modern methods. This dose is the equivalent of a lifetime of 50 years against a background of 570x650mR/h.
5 mSv – permissible dose (PD) – annual permissible individual equivalent dose for a person living in sanitary protection zones or radiation-control nuclear industry areas (category B). Such annual dose of regular irradiation for 70 years cannot cause negative changes in health detectable by modern methods of diagnostics. For this dose the permissible safe background is 55x65 mR/h (0.6 ЯSv/h).
0.5 mSv – previously accepted annual maximum permissible individual equivalent dose of external and internal irradiation for all population. Currently this dose is not regulated. It equals a background of 5-7 mR/hac (0.06 ЯSv/h).
0.1 Sv during 1 year – no perceptible changes detected in tissues and organs.
0.75 Sv - minor changes in the blood.
1 Sv - lower threshold of the radiation sickness.
3-5 Sv - grave radiation sickness, 50% of irradiated persons die.

Маркировка и пломбирование

На корпусе изделия нанесено наименование изделия. Заводской номер и дата выпуска находятся в батарейном отсеке под аккумулятором. Изделие предприятием-изготовителем не пломбируется.

Упаковка

Упаковка обеспечивает сохранность изделия при транспортировке и хранении при нормальных климатических условиях.

Транспортирование и хранение

Транспортирование изделия в упаковке может производиться любым видом транспорта на любое расстояние.

При транспортировании изделия необходимо обеспечить защиту его от атмосферных осадков.

Условия транспортирования изделия в упаковке должны соответствовать:

- температура окружающей среды от –40° до +60°С.
- относительная влажность при температуре +25°С не более 90%.

Изделие до введения в эксплуатацию следует хранить на складе в упаковке предприятия-изготовителя при температуре окружающей среды от –5° до +40° С и относительной влажности воздуха не более 80% при температуре +25°С. Хранение изделия без упаковки не допускается.

Изделие, в течение длительного времени находящееся при температуре ниже 0°С, должно быть выдержано при комнатной температуре в течение 2 часов перед вводом прибора в эксплуатацию.

Техническое обслуживание

Техническое обслуживание предусматривает:

- удаление пыли с наружной поверхности изделия;
- своевременная замена или подзарядка элементов питания;
- при длительном перерыве в эксплуатации изделия (более 2-х недель) элементы питания должны быть извлечены;
- протирать дисплей только мягкой тканью.

Не допускается попадание посторонних предметов внутрь изделия

Marking and sealing

The name of the device is written on the case. The serial number and date of manufacturing are written in the battery section under the accumulator. The manufacturer does not seal the device.

Package

The package ensures safety of the device during transportation and storage, provided normal climatic conditions.

Transportation and storage

The packed device can by shipped by any type of transport over any distance.

During shipment, the device must be protected against humidity.

Shipping conditions of the packed device must meet the following requirements:

- environment temperatures from -40° to +60°C.
- relative humidity max 90% at +25°C.

Until operation, the device must be stored in the factory package, in a warehouse with air temperatures from -5° to +40° C and maximum relative air humidity 80% (at temperature +25°C). The device may not be stored without the package. If the device remained at below-zero temperatures for a long time, it must be left indoors for 2 hours before use.

Maintenance

Maintenance includes:

- removal of dust from the outer surface of the device;
- timely changing or charging the power elements;
- if the device is not used for a long time (more than 2 weeks), power elements must be uninstalled;
- clean the display with soft cloth only.

Prevent foreign objects from getting inside the device through the accumulator section or perforation on the back side of the device.

Корешок талона на гарантийный ремонт/ Warranty coupon stub

Талон изъят/ Coupon received (date) ____________ 20___ г.____________

Талон на гарантийный ремонт/
Warranty coupon

ЭКОТЕСТЕР SOEKS/
ECOTESTER SOEKS

заводской номер/ serial number

Продан магазином/ Sold by

____
наименование предприятия торговли/ name of the retailing organization

Дата продажи/ Date of sale______/___________________201___г.

Выполнены работы/ Works performed_______________________

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____

Исполнитель/ By____

____

Владелец/ Owner____

____

____

____
фамилия, имя, отчество/ full name   подпись/ signature

ООО “ТД СОЭКС”
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